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SYSTEMATIC STUDIES ON OENOTHERA,—III. NEW SPECIES FROM ITHACA, NEW YORK.

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IN 1911 Prof. G. F. Atkinson cultivated experimentally several *Oenotheras* of the *Oe. biennis* alliance found wild by him in the vicinity of Ithaca, New York, in order to carry on a study of the hybridization phenomena exhibited by these plants. At the suggestion of Dr. Heinrich Hasselbring he sent herbarium material and seeds of three strains to the writer so that they might be compared with certain species which had already been cultivated and given provisional names in the writer's garden at Bethesda, Maryland. One of the Ithaca strains represented a species quite distinct from any which had been previously received, and was treated in this article, as first submitted for publication, as a new species, under a name proposed by Prof. Atkinson. What seems to be the same species, however, was named *Oenothera angustissima* by Gates¹ in an article which reached the editor a few days before this one. The name *Oe. angustissima* has therefore been substituted for Prof. Atkinson's but it has not seemed desirable to withdraw the diagnosis, which is directly comparable with the diagnoses of the other species from Ithaca. The other two strains belonged to species already represented in the writer's collection. The one described as *Oenothera nutans* had been cultivated not only in the Bethesda garden but also, by Prof. B. M. Davis, at Philadelphia, from seed collected at Havre de Grace, Maryland. The other, *Oenothera pycnocarpa*, was one of several types which Dr. Hasselbring had recognized as distinct, and had collected

¹ Gates, R. R. A new *Oenothera*. RHODORA, XV, pp. 45-48. 1913.

for the writer near Flint, Michigan. Because neither the strain from Havre de Grace nor that from Flint has been used in experimental work, it seems best to designate the strains from Ithaca as types of *Oenothera nutans* and *Oenothera pycnocarpa*. Only thus is it possible to insure the unquestionable applicability of the names which will be used shortly by Prof. Atkinson in reporting on his hybrids, since the Ithaca strains may, when grown side by side with those from Maryland and Michigan, show characteristics which one would fail to detect in herbarium specimens. Even in the vicinity of Ithaca there are forms of dubious identity with *Oenothera pycnocarpa* which indicate the propriety of taking every precaution in designating the type of this species. It may therefore be understood that the types of *Oe. nutans* and *Oe. pycnocarpa* described below are specimens collected at Ithaca and preserved in the Cornell University Herbarium. The descriptions have been drawn up from portions of the types in the writer's collection and from notes on the Cornell cultures and specimens kindly supplied by Prof. Atkinson.

OENOTHERA ANGUSTISSIMA Gates. Biennis. Rosula autumnalis compacta depressa viridis, hieme rubescens; foliis planis acutis anguste oblanceolatis 10-19 cm. longis, 2-2.5 cm. latis, utrinque exigue et minutissime puberulis, nervis margineque rubris, lamina plerumque sine maculis rubris, exterioribus longe petiolatis, et, praecipue infra mediam, valde sinuato-dentatis. Planta matura 0.5-1 m. alta, parte inferiore vel simplex vel ramos cauli primario similis sed tertia parte humiliores ferens, superne usque ad inflorescentiam ramis axillaribus vel abbreviatis vel rosulatis praedita. Caulis ruber teres minutissime pilis curvatis acutis verrucosis, pluribus brevissimis, paucis aliquantum longioribus puberulus. Folia sinuato-denticulata utrinque subglabra autumnis ignicantia, apice basique acuta, anguste lanceolata, inferiora ca. 13 cm. longa, 17 mm. lata, brevipetiolata, superiora 5 cm. longa, 8 mm. lata, sessilia. Inflorescentia juvenalis propter rubros calycum apices spectabilis, e spicis terminali aliisque lateralibus brevioribus composita. Bracteae persistentes foliorum modo superiorum obscure denticulatae, 3-4 cm. longae, 4-6 mm. latae, floribus 5-6 cm. longis superatae, apice acuminatae, basi valde rubrotinctae, obtusae vel rotundatae. Ovarium 10-12 mm. longum, sub lente pilis erectis apice rotundatis viscido-puberulum. Hypanthium 25-30 mm. longum etiam viscido-puberulum. Calycis segmenta nondum explicata gemmam quadrangulam 20 mm. longam 4 mm. crassam apicibus liberis rubris distantibus infraterminalibus 3-4 mm. longis coronatam formantia, ad basin versus solum exigue viscido-puberula, sed apicem rubrum versus pilis sparsis longioribus curvatis acutis praedita. Petala flava propter

texturam valde membranaceam cito marcescentia, obcordata, 15–18 mm. longa, 12–15 mm. lata, paululo plicata. Stamina stigmata attingentia, 12–14 mm. longa. Fructus ca. 20 mm. longus, infra mediam ca. 4 mm. crassus, sursum angustatus, quadrangulus, minute viscido-puberulus, costis plerumque rubris.—*Atkinson* No. 9, Ithaca, New York.

Oenothera nutans Atkinson & Bartlett sp. nov. Biennis. Rosula autumnalis compacta, depressa, rubro-maculata; foliis valde undulatis, acutis, lanceolatis, 20–30 cm. longis, 5–6 cm. latis, utrinque sparsim pubescentibus, exterioribus ad basin petiolatam versus solum modice sinuato-dentatis, apicem versus distanter denticulatis, fere integerrimis. Planta matura 1–1.5 m. alta, deorsum ramosa, ramis numerosis, collo tumido enatis, cauli primario similibus sed 20–30 cm. brevioribus, sursum usque ad inflorescentiam ramulis brevissimis abortivis axillaribus praedita. Caulis ruber et viridis conspicue sulcatus, deorsum modice pilosus, sursum minute puberulus et pilosus, longioribus pilis basi rubro-tuberculatis. Folia lanceolata distanter denticulata, utrinque pubescentia, praecipue subtus in nervis; inferiora petiolata apice basique acuta 15–24 cm. longa, 3.5–5 cm. lata, mediocria 12 cm. longa, 3.5 cm. lata, superiora, infra inflorescentiam sita, acuminata, ca. 5.5 cm. longa, 1 cm. lata. Inflorescentia caulem primarium terminans e spicis pluribus composita, lateralibus longis patentibus, aliae, ramos inferiores terminantes saepe simplices, axe deorsum rubro, sursum viridi. Bracteae cito caducae, lanceolatae ca. 2 cm. longae 5 mm. latae, textura coloreque calycis segmentis valde similes. Flores mediocres ca. 70 mm. longi cito marcescentes, tum deinde nutantes. Ovarium, ca. 9 mm. longum et hypanthium gracile ca. 38 mm. longum pilis paucissimis longis curvatis acutis instructa, et exigue pilis rectis apice rotundatis viscido-pubescentia. Calycis segmenta nondum explicata gemmam quadrangulam ca. 22 mm. longam, 4 mm. crassam, inferne fere glabram superne sparsim pubescentem formantia, apicibus liberis viridibus inter se appressis terminalibus 4 mm. longis, pilis numerosis patentibus acutis vestitis. Petala obovata retusa vix emarginata, sub-erosa, ca. 22 mm. longa, 19–20 mm. lata. Stamina petalis aequilonga stigmata attingentia. Fructus ca. 23 mm. longus, infra mediam 5 mm. crassus apicem versus angustatus, viridis, absque pilis rubro-tuberculatis, sparsim pilosus et exigue viscido-pubescent, aetate nitidus fere glabratus, valvulorum apicibus truncatis. Semina diametro ca. 1 mm. castanea.—Type, *Atkinson* No. 2, Ithaca, New York.

Oenothera pycnocarpa Atkinson & Bartlett sp. nov. Biennis. Rosula autumnalis compacta, depressa, viridis; foliis oblanceolatis, utrinque pubescentibus, exterioribus 20–35 cm. longis 4–5 cm. latis, longe petiolatis, infra mediam profunde pinnatifidis, planis vel plus minusve undulatis, albo-nervatis. Planta matura 1.5–2 m. alta deorsum ramosa, ramis strictis numerosis collo tumido enatis, caule primario dimidio brevioribus, sursum usque ad inflorescentiam ramulos

brevissimos vel rosulatos ferens. Caulis viridis vel aetate paulum rubro-tinctus, superiore parte fere teres, inferiore parte interdum subangulosus, pilis brevibus arcuatis crispis aliisque multo longioribus patentibus basi rubro- vel viridi-tuberculatis vestitus. Folia utrinque pubescentia, acuminata, petiolata, denticulata, inferiora spatulata 15–24 cm. longa, 3–4 cm. lata, saepe ad basin versus pinnatifida, mediocria anguste lanceolata, 12–18 cm. longa, 22–33 mm. lata, superiora 6–8 cm. longa 10–20 mm. lata. Inflorescentiae plerumque simplices, vel primaria spicis paucis lateralibus strictis quam terminali multo brevioribus instructa. Bracteae virides foliaceae persistentes sessiles ca. 5 cm. longae, 6–7 mm. latae, denticulatae, apicem hypanthii plerumque attingentes, pubescentes. Flores mediocri ca. 72 mm. longi, textura firmissculi, non cito marcescentes. Ovarium ca. 14 mm. longum dense cum pilis ascendentibus longis acutis aliisque rectis brevibus apice rotundatis viscidis tectum. Hypanthium ca. 38 mm. longum viscido-pubescentia etiam pilis longioribus curvatis exornatum. Calycis segmenta nondum explicata gemmam quadrangulam 23–25 mm. longam, 5 mm. crassam, ambabus pilorum speciebus dense vestitam formantia, apicibus liberis viridibus inter se appressis terminalibus 3–5 mm. longis. Petala cuneato-obcordata profunde emarginata firmisscula plana flava. Fructus 2.5–3.3 cm. longus a bractea persistenti superatus basi 5 mm. crassus apicem versus angustatus, pubescens, valvulorum apicibus truncatis. Semina 1.5 mm. longa.—Type, *Atkinson* No. 1, Ithaca, New York.

The following summary will serve to indicate the characters which distinguish these three species from one another. It will of course prove entirely misleading if any attempt is made to apply it in the identification of *Oenotheras* from other localities, without checking up other characters included in the foregoing diagnoses. Nevertheless it is presented in the hope that it may be useful to local botanists who would take an interest in the problem of differentiating their local elementary species of *Oenothera* if they knew the nature of some of the characters which have been found constant in heredity and which should therefore be looked for in the field.

Free tips of the calyx segments infraterminal; therefore widely separated in bud *Oe. angustissima*.

Free tips of the calyx segments terminal; therefore in contact in bud.

Bracts caducous when the flower wilts.....*Oe. nutans*.

Bracts persistent until the capsules ripen.....*Oe. pycnocarpa*.

Oenothera angustissima. Rosette leaves flat, green, not spotted, red-nerved, becoming red in the winter, outer ones sinuate-dentate. Stem red, terete with no red-tuberculate hairs. Leaves almost glabrous, fiery red in autumn. Bracts persistent, red at the base.

Free tips of the calyx segments bright red. Petals of very delicate texture, somewhat plicate, quickly wilting.

Oenothera nutans. Rosette leaves crinkled, red-spotted, with reddish mid-vein, not becoming uniformly red in the winter, outer ones slightly sinuate-dentate. Stem red and green, channeled, with red-tuberculate hairs. Leaves moderately pubescent on both sides. Bracts yellowish-green or nearly colorless, short, quickly deciduous. Free tips of the calyx segments green. Flower of delicate texture, quickly wilting and then nodding; petals somewhat plicate.

Oenothera pycnocarpa. Rosette leaves flat or only somewhat crinkled, green, white-nerved, outer ones deeply pinnatifid. Stem green, nearly terete, with red-tuberculate hairs. Leaves rather densely pubescent on both sides. Bracts leaf-like, persistent. Free tips of the calyx segments green. Flowers of firm texture, not wilting quickly, and not noticeably nodding when wilted. Petals not plicate.

Oenothera angustissima, is not closely related to the two other species. It has its nearest allies in two undescribed species which are known in Maryland and Virginia and which doubtless have a wider distribution.

Oenothera nutans and *Oenothera pycnocarpa* would be placed by most botanists in *Oenothera biennis*. Both of them differ from that species, as it is interpreted in the last article of this series, in the mode of branching. *Oe. biennis* has either an inflorescence-bearing branch or a flower in every axil. The leaves grade uniformly into the bracts so that the lower flowers are much exceeded in length by the leaf-like bracts which subtend them. *Oe. nutans* and *Oe. pycnocarpa* agree in that the long basal inflorescence-bearing branches are separated from the inflorescence of the primary stem by an interval in which the leaf-axils are occupied by abbreviated, frequently rosette-like, vegetative branches. Prof. Atkinson has in preparation a paper on hybrids of these two species which will include illustrations of the type plants.

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